Draft Environmental Assessment

City of Edmond-Willowood Flood Protection Project

Oklahoma County, Oklahoma

HMGP-DR-1678-OK Project #52

March 2011

FEMA

Federal Emergency Management Agency
Department of Homeland Security
500 C Street, SW
Washington, DC 20472

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Contract No. HSFEHQ-06-D-0162
Task Order No. HSFEHQ-06-J-0048

15707048.00100

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ACHP	Advisory Council on Historic Preservation
ACOG	Association of Central Oklahoma Governments
amsl	above mean sea level
APE	Area of Potential Effect
BMP	Best Management Practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CWA	Clean Water Act
dB	decibel
DNL	Day-Night Average Sound Level
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
HMGP	Hazard Mitigation Grant Program
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWP	Nationwide Permit
O_3	ozone
OAS	Oklahoma Archeological Society
OCC	Oklahoma Conservation Commission
ODEQ	Oklahoma Department of Environmental Quality
ODWC	Oklahoma Department of Wildlife Conservation

OEM	Oklahoma Department of Emergency Management
OSHA	Occupational Safety and Health Administration
OWRB	Oklahoma Water Resources Board
Pb	lead
$PM_{2.5}$	particulate matter less than 2.5 microns
PM_{10}	particulate matter less than 10 microns
PukA	Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded
PulA	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SWPPP	Storm Water Pollution Prevention Plan
URS	URS Group, Inc.
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

1.1 PROJECT AUTHORITY

The City of Edmond, Oklahoma, through the Oklahoma Department of Emergency Management (OEM), has applied to the Federal Emergency Management Agency (FEMA) for assistance through the Hazard Mitigation Grant Program (HMGP) under Presidential Disaster Declaration FEMA-DR-1678-OK Project #52 for improving flood protection in the Willowood subdivision.

In accordance with Title 44 of the Code of Federal Regulations (CFR), Subpart B, Agency Implementing Procedures, Part 10.9, this Environmental Assessment (EA) has been prepared pursuant to Section 102 of the National Environmental Policy Act of 1969 (NEPA), as implemented by the regulations promulgated by the President's Council on Environmental Quality (CEQ; 40 CFR Parts 1500–1508). The purpose of the EA is to analyze the potential environmental impacts of the proposed project, and to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

1.2 PROJECT LOCATION

The City of Edmond is located in Oklahoma County, Oklahoma, north of Oklahoma City (Figure 1 in Appendix A). The proposed project site is within the Willowood subdivision, located southeast of the intersection of U.S. Highway 77 and North Coltrane Road (Figure 2 in Appendix A). The proposed project site is an approximate 1,395-foot section of a stream channel that extends between Manner Park Avenue and Belmont Drive through the Willowood subdivision. Based on the U.S. Geological Survey (USGS) Edmond, Oklahoma, topographic map, the stream that extends through the neighborhood is an unnamed, intermittent tributary to Spring Creek. This unnamed tributary is identified as Spring Creek Tributary I on FEMA Flood Insurance Rate Map (FIRM) Panel 40109C0065H (Figure 3 in Appendix A; FEMA 2009). The approximate center of the proposed project site is located at geographic coordinates 35.650019˚ North Latitude and 97.439697˚ West Longitude.

2.0 PURPOSE AND NEED

The purpose and need for the project is to prevent flood damages to homes and roadways in the Willowood subdivision during severe rain events. Approximately 1,000 feet of the existing channel that extends through the Willowood subdivision is a 30-foot-wide, concrete bottom, trapezoidal channel; this portion of the channel has the capacity to contain a 10-year flood event and has experienced frequent flooding from severe rainfall events, resulting in significant damage to approximately 50 homes in the Willowood subdivision and the overtopping of Lonsdale Drive by floodwaters. High flow velocities in Spring Creek Tributary I have also caused severe scouring of the Lonsdale Drive culvert, and the subsequent partial collapse of the roadway. Lonsdale Drive is the only roadway that provides access to 59 homes on Lonsdale Drive, Belmont Drive, and Belmont Circle; these homes are cut off from emergency services when Lonsdale Drive is overtopped by floodwaters.

FEMA's Hazard Mitigation Grant Program (HMGP) provides grants to state and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

3.0 ALTERNATIVES

This section describes the alternatives that were considered in addressing the purpose and need stated in Section 2 above. Two alternatives were evaluated: the No Action Alternative, and the Proposed Action Alternative, which consists of channel improvements to Spring Creek Tributary I.

Alternative 1: No Action

Under the No Action Alternative, no improvements would be made to Spring Creek Tributary I. The infrastructure and homes in the Willowood subdivision would remain at risk of flooding and damage. Residents whose homes are east of Spring Creek Tributary I on Lonsdale Drive, Belmont Drive, and Belmont Circle would remain at risk of being cut off from emergency services when Lonsdale Drive is overtopped by flood waters.

Alternative 2: Construction of the Willowood Flood Protection Project (Proposed Action)

Under the Proposed Action Alternative, the City of Edmond proposes channel improvements to approximately 1,395 linear feet of Spring Creek Tributary I that would reduce the likelihood of future flooding events within the Willowood subdivision (see Appendix B for detailed design documents). Proposed improvements include:

- Lowering the Lonsdale Drive culvert system approximately 6.5 feet and upgrading the system from a double 10-foot-wide by 5-foot-high concrete box structure to a four cell 10-foot-wide by 10-foot-high concrete box structure. The proposed project would include installation of a concrete-bottom transition with grouted riprap side slopes to be installed on the northern side of the culvert system (Station 25+50 to 24+95). In addition, the existing ground adjacent to the channel, upstream from the new culvert will be raised to an elevation of 1,066 feet North American Vertical Datum (NAVD) of 1988 to prevent overtopping of Lonsdale Drive. The project includes the replacement of approximately 140 linear feet of 28-foot wide asphalt roadway with curb and gutter and 280 linear feet of adjacent sidewalk in the area disturbed by the construction of the new reinforced concrete box on Lonsdale drive.

- Modifying the existing Willowood channel system. The existing trapezoidal channel has a concrete bottom that varies from 20 to 30-foot in width and has eroded earthen side slopes between stations 15+00 to 24+20. The new channel will be a 30 foot wide vertical wall concrete channel from station 12+50 to 23+46, then transitioning to 46 feet in width to the four cell 10-foot wide by 10-foot high concrete box structure. From station 24+75 to station 25+50, the channel transitions back to existing earthen channel with a sloping drop structure. In addition, existing in-channel elevated manhole covers, which provide access to a sanitary sewer line that is buried under the channel, would be replaced with at-grade sealed manhole covers.

- Re-grading an additional 175 feet of Spring Creek Tributary I to allow transition from the improved channel from stations 10+00 to 11+75. The channel is to be graded to drain to

the existing undisturbed channel. This work will be confined to the bottom of the channel only with no re-grading outside the low banks. A single rip-rap check dam will be placed in the channel to control sedimentation at station 10+50. Additional hydraulic controls include four drop structures along the length of the modified channel to reduce flow velocities (stations 24+95, 25+50, 15+00 and 13+60).

The proposed improvements will increase the channel capacity from a 10-year to a 100-year flood event and will reduce the risk of property damage due to flooding within the Willowood subdivision.

This proposed alternative as described above takes into account input from the U.S. Army Corps of Engineers (USACE). A consultation letter, dated February 3, 2010, was submitted to the USACE (see Appendix C). USACE recommended via telephone conversations that the project design be modified so that the work could be completed under several Nationwide Permits. USACE further recommended that the project be designed to require new work in less than $1/10^{th}$ of an acre of natural stream channel so that it would not require stream mitigation at a minimum ratio of 10:1 to offset impacts to the riparian zone.

Alternatives Considered but Dismissed

Two additional alternatives involving property acquisition were considered and dismissed because they were not considered feasible and residents whose homes are east of Spring Creek Tributary I on Lonsdale Drive, Belmont Drive, and Belmont Circle would remain at risk of being cut off from emergency services when Lonsdale Drive is overtopped by flood waters.

A final alternative which consisted of more extensive channel improvements to unmodified stretches of the creek was also considered and dismissed during project scoping. This alternative involved additional modifications to the natural streambed south of the subdivision. In consideration of input from the USACE regarding permitting of the project, this alternative was redesigned into the Proposed Action Alternative design.

In a response letter dated March 5, 2010, the Oklahoma Conservation Commission (OCC) recommended that the principles of fluvial geomorphology with natural channel design and riparian vegetative plantings be used to stabilize the stream system as an alternative to concrete and riprap and that wetlands adjacent to the channel be utilized for floodwater storage. OCC also stated that natural stabilization and storage is considerably more economical and beneficial to the environment than historical conveyance and stabilization techniques; restoring riparian corridors using fluvial geomorphology ultimately produces stream systems that are more stable and efficient in transporting bed load and flood flows while providing habitat and water quality benefits for citizens and wildlife. A vertical-wall channel was required to accommodate the volume of water expected from a 100-year flood because of the space limitations in the Willowood subdivision. The vertical-wall design precludes the use of natural channel design and substrates within the portion of the channel confined by the homes of the Willowood subdivision. Downstream of the Willowood subdivision, the water velocity of water exiting the vertical-wall segment is anticipated to be too high to allow for natural channel design and plantings. Riprap was chosen to prevent scouring of the bed and banks in the downstream portion of the proposed project.

4.0 AFFECTED ENVIRONMENT AND IMPACTS

This section describes the potential impacts of the Proposed Action Alternative and the No Action Alternative. Where potential impacts exist, conditions or mitigation measures to offset these impacts are detailed. A summary table is provided in Section 4.11.

4.1 GEOLOGY AND SOILS

The Geologic Map of the Edmond 7.5-minute Quadrangle indicates the proposed project site is underlain by the Garber formation of the Permian time period (Hemish and Suneson 1998). The Garber formation is primarily comprised of fine-grained to medium-fine-grained sandstone. Within and adjacent to Spring Creek Tributary I, the Garber formation is overlain by alluvium from the Holocene time period. Alluvium consists of clay, silt, sand, and gravel in channels and on floodplains of modern streams and rivers.

A review of the U.S. Geological Survey (USGS) 7.5-minute topographic map for the Edmond quadrangle indicates that the approximate elevation of the proposed project site is 1,055 feet above mean sea level (amsl) with a slope to the southeast toward Spring Creek (USGS 1983).

According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) online Web Soil Survey, the proposed project site contains soils classified in the Pulaski Series: Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded (PukA) and Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded (PulA) (USDA/NRCS 2009). The Pulaski series consists of very deep, well-drained, moderately rapidly permeable soils that formed in loamy alluvial sediments of recent age and are found on nearly level to gently sloping floodplains of small tributaries within the Cross Timbers (USDA/NRCS 2003).

The Farmland Protection Policy Act (FPPA) states that federal agencies must "minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses…" PukA soils, which are mapped across 70 percent of the project area, are not considered prime farmland soils; however, all areas of PulA, which are mapped across 30 percent of the project area, are considered prime farmland soils (USDA/NRCS 2009).

No Action Alternative – Under the No Action Alternative, no construction would occur and there would be no impacts to geology or soils.

Proposed Action Alternative – Under the Proposed Action Alternative, construction activities would not be deep enough to impact underlying geologic resources. Sediments and soils would be excavated from Spring Creek Tributary I to complete the proposed improvements. The applicant must prepare a Storm Water Pollution Prevention Program Plan (SWPPP) and obtain a National Pollutant Discharge Elimination System (NPDES) permit prior to construction. As required by General Permit OKR10 for Storm Water Discharges from Construction Activities within the State of Oklahoma, the SWPPP will include appropriate control measures (i.e., Best Management Practices [BMPs]) including erosion and sediment controls that will be implemented as part of the construction activity to control pollutants in storm water discharges. Excavated soil and waste materials must be managed and disposed of in accordance with applicable local, state, and federal regulations. If contaminated materials are discovered during the construction activities, the work must cease until the appropriate procedures can be implemented and permits obtained. The project area is exempt from the FPPA because it is located within the Oklahoma City Urbanized Area on the United States Census Bureau (USCB

2000) urbanized area maps, and the land is therefore considered to be already converted to nonagricultural use (USCB 2002).

A letter requesting project review was sent to the NRCS on February 3, 2009. In a response letter dated March 22, 2010, the NRCS stated that the agency had no objections to the proposed project (Appendix C).

4.2 WATER RESOURCES

4.2.1 Surface Water

The Clean Water Act (CWA), as amended in 1977, established the basic framework for regulating discharges of pollutants into the waters of the U.S.

Spring Creek Tributary I flows into Spring Creek, which is a part of the Deep Fork watershed (Hydrologic Unit Code 11100303). Spring Creek is currently listed on the Oklahoma 303(d) list of impaired waters due to high levels of *Escherichia coli* bacteria (Waterbody ID: OK520710020030_00). The 303(d) list is a list maintained by the state, as mandated by Section 303 of the Clean Water Act, of water bodies within the state that do not meet established water quality standards (ODEQ 2008).

No Action Alternative – Under the No Action Alternative, no construction would occur and there would be no impacts to surface water.

Proposed Action Alternative – Under the Proposed Action Alternative, construction would take place within approximately 1,395 linear feet of Spring Creek Tributary I. Approximately 250 feet of natural stream channel would be improved to a concrete channel with vertical concrete walls. Approximately 1,000 feet of the existing concrete-lined channel with maintained grass banks would be replaced with a concrete-lined channel with vertical concrete walls.

Construction activities would require excavation within the stream channel and banks. This excavation would increase erosion and sediment transport to downstream waters during the construction period. The applicant must prepare a SWPPP and obtain an NPDES permit prior to construction. To reduce impacts to surface water, and as required by General Permit OKR10, the applicant will implement appropriate BMPs including erosion and sediment controls as part of the SWPPP. As part of the proposed project, the elevated manholes that serve the sanitary system that extends below the stream channel would be replaced with at-grade sealed manhole covers that would vent to manholes adjacent to the stream channel.

Conversion of 250 feet of natural stream channel to a concrete-bottom channel would reduce the ability of that portion of the channel to filter and clean water through riparian, in-stream, and hyporheic processes. (The hyporheic zone is defined as a subsurface volume of sediment and porous space adjacent to a stream through which stream water readily exchanges.) In addition, the proposed project converts the banks of the existing 1,000 feet of previously channelized stream from natural substrates to vertical concrete walls. This will further reduce the ability of the riparian zone in this area to filter stormwater runoff prior to it entering the stream. The proposed project is in lieu of, and decreases the future potential for, restoration of the existing concrete-lined channel to a functional stream system.

On February 3, 2010, letters were sent to the U.S. Environmental Protection Agency (EPA), Oklahoma Department of Environmental Quality (ODEQ), and the Oklahoma Conservation

Commission (OCC) requesting project review and comments. To date, no response has been received from EPA.

In a response letter dated April 7, 2010, ODEQ stated that the agency had no objections to the project but advised that the project falls within the watershed of Arcadia Lake, a USACE lake and a public water supply lake, and that any work performed should comply with any USACE restrictions and also with any restrictions contained in the Oklahoma Water Quality Standards relevant to public water supply lakes.

In a response letter dated March 5, 2010, OCC stated that the agency has concerns regarding the loss of stream and riparian functions and habitat resulting from lining the described channel with concrete and riprap. Additionally, OCC stated that the proposed drop-down structures would reduce water velocity, but that the water will flow wholly untreated through the concrete flume to Lake Arcadia, the drinking water source for the City of Edmond. OCC recommends that the principles of fluvial geomorphology with natural channel design and riparian vegetative plantings be used to stabilize the stream system as an alternative to concrete and riprap and that wetlands adjacent to the channel be utilized for floodwater storage. OCC also stated that natural stabilization and storage is considerably more economical and beneficial to the environment than historical conveyance and stabilization techniques; restoring riparian corridors using fluvial geomorphology ultimately produces stream systems that are more stable and efficient in transporting bed load and flood flows while providing habitat and water quality benefits for citizens and wildlife.

Because of the space limitations in the Willowood subdivision, a vertical-wall channel was required to accommodate the volume of water expected from a 100-year flood. The vertical-wall design precludes the use of natural channel design and substrates within the portion of the channel confined by the homes of the Willowood subdivision. Downstream of the Willowood subdivision, the water velocity of water exiting the vertical-wall segment is anticipated to be too high to allow for natural channel design and plantings. Riprap was chosen to prevent scouring of the bed and banks in the downstream portion of the proposed project.

4.2.2 Groundwater

The subject property is located above the Central Oklahoma Aquifer (Garber-Wellington Aquifer), which underlies approximately 2,900 square miles in central Oklahoma (USGS 2009). This aquifer is composed primarily of the Garber Sandstone and the Wellington Formation (USGS 2009, ACOG 2004). The aquifer is an important source of water to several suburban Oklahoma City communities and provides water to numerous domestic water supplies. With the exception of Oklahoma City, all of central Oklahoma's major communities rely wholly or partially on groundwater (USGS 2009).

A Phase I Environmental Site Assessment (ESA) was performed on the subject property (URS 2009; see Appendix E). Although groundwater quality testing was not performed as a part of the ESA, no recognized environmental conditions were identified that would indicate the potential for contamination of groundwater by hazardous materials. A report by the Association of Central Oklahoma Governments (ACOG) indicates that there is saltwater intrusion in near-surface groundwater in the vicinity of the proposed project due to improperly capped oil and gas operations (2004).

No Action Alternative – Under the No Action Alternative, no construction would occur and there would be no impacts to groundwater.

Proposed Action Alternative – Under the Proposed Action Alternative, construction activities would not reach a sufficient depth to directly impact groundwater. If the proposed project requires additional excavation to groundwater depths, the applicant must consult with the EPA, ODEQ, and the Oklahoma Water Resources Board (OWRB) to identify appropriate mitigation.

Conversion of stream channels from natural materials to impervious concrete limits water transfer between the stream channel, the hyporheic zone, and near-surface groundwater. Hyporheic zones are shallow aquifers directly below and adjacent to stream channel that act as a mixing zone between surface water and groundwater (Boulton et al. 2010, Hester and Gooseff 2010). The interaction between surface water and the water in the hyporheic zone is important to surface water quality because the hyporheic zone contains an array of microbial communities and environmental conditions that tend to contribute to nutrient uptake and pollution reduction. Additionally, groundwater exchange moderates the temperature of surface waters, which is important to the success of in-stream organisms. The proposed project would convert approximately 250 feet of natural stream to a concrete-bottom channel and would further modify 1,000 feet of concrete-lined channel with grass-planted engineered banks to a concrete-lined channel with vertical concrete sides. These modifications are necessary to manage supercritical flow and subsequent bank erosion in the channel. The proposed project should have no impact on existing saltwater intrusion of near-surface groundwater in the project area.

Land subsidence is a gradual settling or sudden sinking of the land surface due to subsurface movement of earth materials. Main causes of subsidence include aquifer-system compaction, drainage of organic soils, underground mining, hydro-compaction, and sinkholes. Excessive ground-water pumping is the largest cause of subsidence, and it can lead to the compaction of unconsolidated aquifer systems. Subsidence and sudden sinking of soil are generally associated with karst terrain which consists of certain rock types, such as evaporites (salt, gypsum, and anhydrite) and carbonates (limestone and dolomite) [USGS 2000; *http://water.usgs.gov/ogw/karst/index*]. The Central Oklahoma Aquifer (Garber-Wellington Aquifer) is not associated with karst formations and soil subsidence is not expected as a result of the proposed project (USGS 1996).

On February 3, 2009, a letter was sent to the EPA, ODEQ, OWRB, and OCC requesting project review and comments. No response has been received from the EPA. The responses received from OCC, ODEQ, and OWRB did not address groundwater; the responses from these agencies are described in Section 4.2.1, Surface Water.

4.2.3 Floodplains

Executive Order (EO) 11988 (Floodplain Management) requires federal agencies to avoid direct or indirect support of development within the 100-year floodplain whenever there is a practicable alternative. FEMA uses Flood Insurance Rate Maps (FIRMs) to identify the regulatory 100-year floodplain for the National Flood Insurance Program (NFIP). Consistent with EO 11988, FIRMs were examined during the preparation of this EA. The proposed project site is located within the Spring Creek Tributary I floodway and Zone AE, the 100-year floodplain per panel 40109C0065H, dated December 18, 2009 (see Figure 3 in Appendix A).

No Action Alternative – Under the No Action Alternative, no construction would occur and there would be no impacts to the floodplain. The homes and infrastructure in the Willowood subdivision would remain at risk of flooding and damage. Additionally, residents of the 59 homes on Lonsdale Drive, Belmont Drive, and Belmont Circle east of the Lonsdale Drive culvert would remain cut off from emergency services when Lonsdale Drive is overtopped by floodwaters.

Proposed Action Alternative – Under the Proposed Action Alternative, construction would take place within the 100-year floodplain and the Spring Creek Tributary I floodway. A hydrologic and hydraulic analysis has been performed that indicates the proposed project should increase the channel capacity within the Willowood subdivision from the 10-year flood to the 100-year flood and reduce flooding in surrounding areas (Meshek & Associates 2008). This project has been designed in accordance with accepted floodplain management practices, and should provide a positive benefit to local drainage. Staging areas for equipment and materials will be identified by the selected construction contractor. The City of Edmond must require the construction contractor to establish staging areas outside of the regulatory floodplain. Any equipment that is used during construction activities in the floodplain must be removed from the floodplain at the end of each work day.

Letters requesting project review and comments were sent to the City of Edmond Floodplain Administrator and the OWRB on February 3, 2010. In a response letter dated March 10, 2010, the City of Edmond Floodplain Administrator stated that hydraulic modeling has been used extensively in the development of this project's design to ensure that there will not be any detrimental floodplain effect to any upstream, downstream, or adjacent property in this area, thus resulting in a No-Rise Certification. In a response letter dated March 22, 2010, the OWRB recommended that the local floodplain administrator be contacted and advised that the project may need a permit from the OWRB if it is on state-owned or operated land. The proposed project is not located on state-owned or operated land. Input from these agencies was considered when completing the 8 step decision-making process that is required under EO 11988 when a federal agency carries out an action within the regulatory floodplain (see Appendix D).

4.2.4 Waters of the U.S. Including Wetlands

The USACE regulates the discharge of dredged or fill material into waters of the U.S., including wetlands, pursuant to Section 404 of the CWA. Additionally, EO 11990 (Protection of Wetlands) requires federal agencies to avoid, to the extent possible, adverse impacts to wetlands.

A wetland determination was conducted on the proposed project site on November 20, 2007 (Eagle Environmental Consulting 2007). This wetland determination found two wetland areas in the vicinity of the proposed project. A review of the National Wetland Inventory did not indicate the presence of wetlands in the project area.

Spring Creek Tributary I is considered to be jurisdictional waters of the U.S. by the USACE.

No Action Alternative – Under the No Action Alternative, there would be no construction and no impacts to waters of the U.S., including wetlands, would occur.

Proposed Action Alternative – This proposed alternative takes into account input from the USACE. A consultation letter, dated February 3, 2010, was submitted to the USACE District (see Appendix C). USACE recommended via telephone conversations that the project design be

modified so that the work could be completed under several Nationwide Permits. USACE further recommended that the project be designed to require new work in less than 1/10th of an acre of natural stream channel so that it would not require stream mitigation at a minimum ratio of 10:1 to offset impacts to the riparian zone.

Under the Proposed Action Alternative, no vegetated wetlands would be impacted because the wetlands that were identified during the wetland determination are outside of the proposed project footprint. Construction within Spring Creek Tributary I would impact waters of the U.S. and would require authorization from the USACE. A consultation letter, dated October 11, 2010, was submitted to the USACE Tulsa District requesting agency review and comments regarding the Proposed Action Alternative. USACE responded via email on October 14, 2010, and USACE confirmed that the proposed project falls within the scope of multiple Nationwide Permits (NWPs): NWP 13 for Bank Stabilization; NWP 14 for Linear Transportation Projects; and NWP 31 for Maintenance of Existing Stormwater Control Projects. The City of Edmond must comply with all conditions of NWPs 13, 14, and 31 and must remain informed of changes to the NWPs and their conditions as they occur. All three NWPs expire on March 18, 2012. If the City of Edmond commences, or is under contract to commence, the activity before the date the NWP is modified or revoked, the City will have 12 months from the date of the modification or revocation to complete the activity under the present terms of the NWPs.

4.3 TRANSPORTATION

The proposed project site is located southeast of the intersection of U.S. Highway 77 and South Coltrane Road. Only neighborhood roadways are located within the proposed project area. Lonsdale Drive provides the only access to approximately 59 homes located on the eastern side of Spring Creek Tributary I and within the Willowood subdivision. Lonsdale Drive has been overtopped and damaged by previous flood events, causing the 59 homes to be inaccessible by emergency services.

No Action Alternative – Under the No Action Alternative, no construction would occur and there would be no impacts to transportation. Residents of the 59 homes on the eastern side of Spring Creek Tributary I would continue to be at risk of being cut off from emergency services when Lonsdale Drive is flooded.

Proposed Action Alternative – Under the Proposed Action Alternative, there would be a minor temporary increase in the volume of construction traffic on roads in the immediate vicinity of the proposed project site that could potentially result in a slower traffic flow during the construction phase. To mitigate potential delays, construction vehicles and equipment must be stored onsite during project construction and appropriate signage must be posted on affected roadways.

Partial closure of Lonsdale Drive may be necessary during culvert installation and repaving. This would affect residents of the 59 homes located in the Willowood subdivision east of Spring Creek Tributary I. The impact is expected to be short-term and minor. Over the long-term, replacing the culvert should have a positive impact on transportation. The proposed culvert and channel modifications would reduce the risk of Lonsdale Drive being overtopped by flood waters during future flooding events. This would reduce the risk of damage to the roadway and would also reduce the risk of emergency personnel not being able respond to the 59 homes during flooding conditions.

A letter requesting project review and comments was sent to the Oklahoma Department of Transportation on February 3, 2010. No response has been received to date.

4.4 ENVIRONMENTAL JUSTICE

EO 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) mandates that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Socioeconomic and demographic data for the project area were reviewed to determine if the proposed action would have a disproportionate impact on minority or low-income persons.

The proposed project site is located in Census tract 1081.08, which has low-income and minority populations slightly higher than the City of Edmond, but lower than Oklahoma County and the State of Oklahoma (USCB 2000).

	State of Oklahoma	Oklahoma County	City of Edmond	Census Tract 1081.08
Total Population (2000)	3,450,654	660,448	68,315	6,941
Annual median household income	$33,400	$35,063	$54,556	$44,194
% Individuals below poverty level	14.7	15.3	7.2	12.8
% Minority population	23.8	29.6	13.4	15.7
% Hispanic (any race)	5.2	8.7	2.8	3.0

No Action Alternative – Under the No Action Alternative, there would be no disproportionately high or adverse impacts to minority or low-income populations. All residents in the Willowood subdivision would continue to be at risk of future flooding events.

Proposed Action Alternative – Under the Proposed Action Alternative, there would be no disproportionately high or adverse impacts to minority or low-income populations. All residents of the Willowood subdivision would benefit from the reduced flood risk that would result from the proposed project.

4.5 AIR QUALITY

The Clean Air Act (CAA) requires that states adopt ambient air quality standards. The standards have been established in order to protect the public from potentially harmful amounts of pollutants. Under the CAA, the EPA establishes primary and secondary air quality standards. Primary air quality standards protect the public health, including the health of "sensitive populations, such as people with asthma, children, and older adults." Secondary air quality standards protect public welfare by promoting ecosystem health, and preventing decreased visibility and damage to crops and buildings. EPA has set national ambient air quality standards

(NAAQS) for the following six criteria pollutants: ozone (O_3), particulate matter ($PM_{2.5}$, PM_{10}), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead (Pb). According to the EPA, no counties in Oklahoma are classified as nonattainment areas for criteria pollutants (EPA 2010).

No Action Alternative – Under the No Action Alternative, no construction would occur and there would be no impacts to air quality.

Proposed Action Alternative – Under the Proposed Action Alternative, no long-term impacts to air quality would occur. Short-term impacts to air quality may occur during construction. To reduce temporary impacts to air quality, the construction contractors will be required to water down construction areas to control dust when necessary. Emissions from fuel-burning internal combustion engines (e.g., heavy equipment and earthmoving machinery) could temporarily increase the levels of some of the criteria pollutants, including CO, NO_2, O_3, PM_{10}, and non-criteria pollutants such as volatile organic compounds. To reduce the emission of criteria pollutants, fuel-burning equipment running times will be kept to a minimum and engines will be properly maintained.

4.6 NOISE

Noise is generally defined as unwanted sound. Sound is most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sounds that the human ear can hear. The Day-Night Average Sound Level (DNL) is an average measure of sound. The DNL descriptor is accepted by federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses. EPA guidelines, and those of many other federal agencies, state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for noise-sensitive land uses such as residences, schools, or hospitals. The proposed project site is located in a mainly residential area.

No Action Alternative – Under the No Action Alternative, no construction would occur and there would be no impacts to noise levels.

Proposed Action Alternative – Under the Proposed Action Alternative, temporary short-term increases in noise levels are anticipated during the construction period. The proposed project area is within a residential neighborhood and homes are located immediately adjacent to the construction site. To mitigate noise impacts, construction activities will take place during normal business hours. Equipment and machinery installed at the proposed project site must meet all local, state, and federal noise regulations.

4.7 BIOLOGICAL RESOURCES

The proposed project area consists of 1,395 feet of a drainage channel that extends through a residential neighborhood. Approximately 1,000 feet of the existing channel is concrete-lined. Upstream of the concrete-lined portion of the channel, Spring Creek Tributary I has been previously widened and has an earthen bed and banks with engineered side slopes. The project area also includes 250 feet of channel downstream of the concrete-lined portion. This downstream portion has a natural bed and banks that, although incised, do not appear to be engineered. This portion of the stream is paralleled by a sewer line and is crossed by a pipeline corridor.

The U.S. Fish and Wildlife Service (USFWS) lists the following federally threatened and endangered species for Oklahoma County:

Common Name	Scientific Name	Status
Least tern	*Sterna antillarum*	E
Whooping Crane	*Grus americana*	E
Piping Plover	*Charadrius melodus*	T
Arkansas River shiner	*Notropis girardi*	T
Source: USFWS 2009a, 2009b, E=Endangered; T=Threatened		

A large section of the Canadian River in Oklahoma is designated as critical habitat for the Arkansas River shiner (USFWS 2005). However, no critical habitat for the Arkansas River shiner is located within, or downstream of Spring Creek Tributary I. Additionally, the project site does not appear to contain habitat for the interior least tern, whooping crane, or piping plover.

Meshek and Associates, the City of Edmond's engineering firm, provided preliminary project designs to the USFWS in 2009 as part of a Section 404 permit application to the USACE. In a letter to Meshek and Associates dated August 12, 2009, USFWS stated that no adverse impact on federally listed species is anticipated as a result of the proposed project (Appendix C).

No Action Alternative – Under the No Action Alternative, there would be no impacts to biological resources, including federally protected species.

Proposed Action Alternative – Under the Proposed Action Alternative, approximately 250 feet of stream channel that currently have bed and banks consisting of natural materials will be converted to concrete bed and banks. There is no suitable habitat for federally protected species at the proposed site. Therefore, no federally protected species are likely to occur on the site and no impacts to federally protected species are anticipated.

Concrete-lined stream channels reduce natural habitats available to fish, invertebrates, and other organisms that would inhabit a natural stream system. The proposed project would convert approximately 250 feet of natural stream to a concrete-bottom channel and would further modify approximately 1,000 feet of concrete-lined channel with grass planted engineered banks to a concrete-lined channel with vertical concrete sides. These areas would provide minimal habitat for aquatic organisms, therefore the project would negatively impact aquatic organisms in the immediate vicinity of the channelization due to habitat loss. However, the City of Edmond must comply with the conditions of NWPs 13, 14, and 31, including those conditions that pertain to aquatic life movements. Per the NWPs, the construction activity cannot substantially disrupt the necessary life-cycle movements of aquatic species indigenous to the water body, including species that migrate through the area. In addition, the affected aquatic populations in the newly channelized portions of the stream would likely transplant further downstream where appropriate habitat will still be available.

Consultation letters, dated February 3, 2010, were submitted to the USFWS and the Oklahoma Department of Wildlife Conservation (ODWC) requesting agency review and comments regarding the proposed project. In a response letter dated March 22, 2010, the ODWC stated that

no state-listed threatened or endangered species are known to occur within the project boundaries and that the project would not likely have lasting negative impacts on listed species found within the state. In a letter to Meshek and Associates dated August 12, 2009, USFWS stated that no adverse impact on federally listed species is anticipated as a result of the proposed project (Appendix C). No additional response regarding the more current scope of work described in the February 2010 letter has been received from the USFWS to date.

4.8 CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA), as amended, and implemented by 36 CFR Part 800, requires federal agencies to consider the effects of their actions on historic properties and provide the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on federal projects prior to implementation. Historic properties are defined as archeological sites, or other historic resources listed in or eligible for listing in the National Register of Historic Places (NRHP).

In February 2009, a URS archeologist and an architectural historian, under the direction of individuals qualified in their respective disciplines consistent with the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61), conducted a review of known cultural resources within the Area of Potential Effects (APE). The APE is the geographic area within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist.

For above-ground resources, the APE consists of the proposed construction footprint to account for direct effects, and a visual buffer of 150 feet on all sides to account for indirect effects. The APE includes the immediate area of Spring Creek Tributary I beginning at approximately 100 feet north of Lonsdale Drive and extending southeast along the drainage for approximately 1,500 feet. The width of the APE (east-west) varies from approximately 350 feet along the concrete-lined channelized section to approximately 400 feet along the non-concrete-lined sections. This APE totals approximately 11 acres and encompasses portions of residential buildings within the Willowood subdivision.

For archeological resources, an APE of approximately 2.13 acres was delineated to include the existing 50-foot wide right-of-way (ROW) for the stream channel, extending the length of the proposed channel improvements. This includes an expanded width to 100 feet for the APE on the north and south ends of the project where the channel is not confined by the Willowood subdivision. This APE corresponds to the construction footprint provided in engineering drawings by Meshek dated July 7, 2009. In October 2010, the scope of work was altered and the APE was subsequently reduced, however, this scaled-down APE is still contained within the February 2009 survey boundaries.

Above-ground Resources: The Oklahoma Historical Society's Landmark Inventory files were searched on March 12, 2009. No previously identified historic properties, districts, or Oklahoma Landmark properties were located within 2 miles of the project area. Aerial photographs were used to determine the construction timelines in the APE and surrounding areas.

Topographic maps and aerial photographs show that the Willowood subdivision was developed after 1983. The 1966 Edmond, OK, topographic map indicates Willowood had not yet been constructed. As the 1966 map was photorevised in 1983, the subdivision would have been

constructed after this time. This is consistent with the architecture of the dwellings in the project area.

A reconnaissance survey of the above-ground APE substantiates the aerial photograph documentation (see Report; Attachments 12 through 13). All buildings appear to date from 1983 or later. No potential historic properties were observed in the project area.

Archeological Resources: Research of the project area in 2009 included a review of the Oklahoma archeological site files, Environmental Data Resources Aerial Photo Decade Package, background data on the local environment, and engineering design plans. Field investigation included a site visit with a pedestrian reconnaissance survey and excavation of one shovel test. Due to previously identified and obvious disturbances and limits imposed by impervious surfaces, one shovel test was placed in the only area of the APE determined to possibly provide undisturbed soils and intact archeological resources.

Archeological sites within the project vicinity were reviewed at Oklahoma Archeological Society (OAS) in Norman on February 27, 2009. Nine archeological sites have been recorded within 3 miles of the project area. All are located along Spring Creek and identified as lithic workshops with the exception of one open camp.

Through pedestrian reconnaissance and surface survey, the project archeologist identified the APE limits and assessed the degree of previous disturbances. The pedestrian survey was documented by field notes, notations on project maps, photographs, and an accompanying log. In addition, a shovel test was excavated at the southern end of the APE.

Summary of Effects to Cultural Resources: Research and field reconnaissance indicate that the project area has been heavily disturbed beginning with canalization of the stream in the 1950s and suburban development and the built environment beginning in the 1980s.

The local prehistoric settlement pattern suggests that there are no preferred landforms in the project area. Soil types identified by the USDA for the project area indicate that in-situ archeological resources are unlikely to be encountered in the dynamic environment of the Pulaski soils of the project area. Engineering schematics indicate that, in addition to the extensive impacts of stream canalization, the project area is crossed by numerous buried utilities. Suburban development in the 1980s resulted in alterations to the surrounding landscape for construction and water flow control measures throughout the neighborhood. Stream channelization materials in the APE included concrete, riprap, and fill soil.

Field reconnaissance confirmed that the APE has been disturbed and altered. Subsurface investigation consisting of one shovel test also confirmed the landform was disturbed. The extensive disturbance and evidence of modern fill episodes indicate a low potential to yield intact archeological deposits.

No Action Alternative – Under the No Action Alternative, no construction would occur and no historic properties would be affected.

Proposed Action Alternative – Under the Proposed Action Alternative, no impacts to archeological or cultural resources are anticipated because none are believed to be present. A Phase I cultural resources survey identified no intact landforms, archeological resources, or historic properties within the APE for the undertaking and FEMA has determined that the proposed project would have no effect on historic properties. The Phase I Archeological and Above-Ground Resource Survey Summary Report (Neel and Cole 2010) Appendix F) was

submitted to Oklahoma State Historic Preservation Office (SHPO) and OAS on December 3, 2010. OAS concurred with FEMA's determination of "No Historic Properties Affected" in a letter dated December 13, 2010, and SHPO concurred in a letter dated December 16, 2010 (see Appendix C).

In the event that archeological deposits, including any Native American pottery, stone tools, bones, or human remains, are uncovered, the project shall be halted and the applicant shall stop all work immediately in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. All archeological findings will be secured and access to the sensitive area restricted. The applicant will inform FEMA immediately and FEMA will consult with the SHPO. Work in sensitive areas cannot resume until FEMA determines that consultation is completed and appropriate measures have been taken to ensure that the project is in compliance with the NHPA.

4.9 SAFETY

Safety and security issues considered in this EA include the health and safety of the area residents and the public-at-large, and the protection of personnel involved in activities related to the proposed project.

EO 13045 (Protection of Children) requires federal agencies to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children.

No Action Alternative – Under the No Action Alternative, Spring Creek Tributary I would not be improved and the homes and infrastructure in the Willowood subdivision would remain at risk of flooding and damage. Additionally, residents of the 59 homes on Lonsdale Drive, Belmont Drive, and Belmont Circle east of the Lonsdale Drive culvert would remain cut off from emergency services when Lonsdale Drive is overtopped by floodwaters.

Proposed Action Alternative – Under the Proposed Action Alternative, improvements to Spring Creek Tributary I would reduce the risk of flooding and damage to homes and infrastructure within the Willowood subdivision. Additionally, channel improvements would decrease the risk of flood waters overtopping Lonsdale Drive and preventing emergency services from reaching homes to the east of the Lonsdale Drive culvert.

The redesigned channel would feature vertical walls up to 10 feet high that would replace the existing sloping banks. Because this would present a potential hazard to pedestrians in the area, project plans include a fence to prevent access to the channel.

Construction activities could also present safety risks to those performing the activities and residents and other pedestrians in the neighborhood. To minimize risks to safety and human health, all construction activities will be performed using qualified personnel trained in the proper use of the appropriate equipment, including all appropriate safety precautions. Additionally, all activities will be conducted in a safe manner in accordance with the standards specified in the Occupational Safety and Health Administration (OSHA) regulations. The appropriate signage and barriers must be in place prior to construction activities to alert pedestrians and motorists of project activities. There would be no disproportionate health and safety risks to children.

4.10 SUMMARY

The following table summarizes the potential impacts of the Proposed Action Alternative and conditions or mitigation measures to offset those impacts.

Affected Environment	Impacts	Mitigation
Geology and Soils	No impacts to underlying geology are anticipated. Soils on the project site would be disturbed during construction.	The applicant must prepare a Storm Water Pollution Prevention Program Plan (SWPPP) and obtain a National Pollutant Discharge Elimination System (NPDES) permit prior to construction. As required by General Permit OKR10, the SWPPP will include erosion and sediment controls that will be implemented as part of the construction activity to control pollutants in storm water discharges. Excavated soil and waste materials must be managed and disposed of in accordance with applicable local, state, and federal regulations. If contaminated materials are discovered during the construction activities, the work must cease until the appropriate procedures can be implemented and permits obtained.
Surface Water	Temporary short-term impacts to downstream surface waters are possible during construction activities. Conversion of 250 feet of natural channel to a concrete channel and further modification of 1,000 feet of concrete-lined channel to a concrete-lined channel with vertical concrete walls would limit the stream system's natural ability to remove pollutants from the water and would reduce in-stream habitat for aquatic organisms.	The applicant must prepare a SWPPP and obtain an NPDES permit prior to construction. As required by General Permit OKR10, the SWPPP will include erosion and sediment controls that will be implemented as part of the construction activity to control pollutants in storm water discharges.

Affected Environment	Impacts	Mitigation
Groundwater	No impacts to groundwater are anticipated. The proposed project would limit exchange between surface water and near-surface groundwater, which may have an impact on surface water quality.	If the proposed project requires additional excavation to groundwater depths, the applicant must consult with the EPA, ODEQ, and OWRB to identify appropriate mitigation.
Floodplains	The proposed project would involve construction within the floodplain, which should decrease flooding in the vicinity of the project area.	The City of Edmond must require the construction contractor to establish staging areas outside of the regulatory floodplain. Any equipment that is used during construction activities in the floodplain must be removed from the floodplain at the end of each work day.
Waters of the U.S. including Wetlands	The proposed project would involve the placement of dredged or fill material within a Water of the U.S.	The City of Edmond must comply with all conditions of NWPs 13, 14, and 31 and must remain informed of changes to the NWPs and their conditions as they occur. All three NWPs expire on March 18, 2012. If the City of Edmond commences, or is under contract to commence, the activity before the date the NWP is modified or revoked, the City will have 12 months from the date of the modification or revocation to complete the activity under the present terms of the NWPs.
Transportation	Short-term, minor temporary increase in the volume of construction traffic on roads in the vicinity of the project area is anticipated. The proposed project would provide long-term benefits to transportation by reducing the chance of Lonsdale drive being overtopped and damaged by flood waters.	Construction vehicles and equipment must be stored onsite during project construction and appropriate signage must be posted on affected roadways.

Affected Environment	Impacts	Mitigation
Environmental Justice	All populations would benefit from the Proposed Action.	None
Air Quality	Short-term impacts to air quality would occur during the construction period.	Construction contractors will be required to water down construction areas to control dust when necessary. Fuel-burning equipment running times will be kept to a minimum and engines will be properly maintained.
Noise	Short-term impacts to noise levels would occur at the proposed project site during the construction period.	Construction activities will take place during normal business hours. Equipment and machinery installed at the proposed project site must meet all local, state, and federal noise regulations.
Biological Resources/ Threatened and Endangered Species	Negative impacts to aquatic organisms in the immediate vicinity of the channelization due to habitat loss. No impacts to any federally protected species are anticipated.	The City of Edmond must comply with the conditions of NWPs 13, 14, and 31, including those conditions that pertain to aquatic life movements. Per the NWPs, the construction activity cannot substantially disrupt the necessary life-cycle movements of aquatic species indigenous to the water body, including species that migrate through the area.
Cultural Resources	No impacts to archeological or cultural resources are anticipated.	In the event that archeological deposits, including any Native American pottery, stone tools, bones, or human remains, are uncovered, the project shall be halted and the applicant shall stop all work immediately in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. All archeological findings will be secured and access to the sensitive area restricted. The applicant will inform FEMA immediately and FEMA will consult with the SHPO. Work in sensitive areas cannot resume until FEMA's determination that consultation is completed and appropriate measures have been taken to ensure that the project is in compliance with the NHPA.

Affected Environment	Impacts	Mitigation
Safety	Positive impacts to public safety are anticipated, because the risk of flooding within the Willowood subdivision would be reduced. Short-term, minor safety impacts would result from construction activities. Long-term, minor safety impacts would result from conversion of the existing channel to a vertical-walled channel up to 10 feet deep.	All construction activities will be performed using qualified personnel trained in the proper use of the appropriate equipment, including all appropriate safety precautions. All activities will be conducted in a safe manner in accordance with the standards specified in the Occupational Safety and Health Administration (OSHA) regulations. The appropriate signage and barriers must be in place prior to construction activities to alert pedestrians and motorists of project activities.

5.0 CUMULATIVE IMPACTS

According to CEQ regulations, cumulative impacts represent the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7)." In accordance with NEPA, and to the extent reasonable and practical, this EA considered the combined effect of the Proposed Action Alternative and other actions occurring or proposed in the vicinity of the proposed project site.

No known additional actions are occurring or proposed in the vicinity of the project area. The majority of the project area, especially the portions in the regulatory floodplain, is already developed, and the proposed project is designed to protect existing residential structures from the effects of flooding. Undeveloped areas in the project area (generally to the southeast of the channelized portion of Spring Creek Tributary I) include a gas pipeline right of way and private property that lies outside of the floodplain and that would not be impacted by the project. Undeveloped areas to the northwest of the project area also currently lie outside of the floodplain. Therefore, the proposed project should not encourage additional development in the floodplain because the land is already developed or it lies out of the floodplain and the proposed project will not offer additional benefit to those areas. No cumulative impacts are anticipated.

6.0 PUBLIC INVOLVEMENT

FEMA is the lead federal agency for conducting the NEPA compliance process for the Willowood Flood Protection Project in the City of Edmond, Oklahoma County, Oklahoma. The lead agency's goal is to expedite the preparation and review of NEPA documents and to be responsive to the needs of the community and the purpose and need of the proposed action while meeting the intent of NEPA and complying with all NEPA provisions.

The City of Edmond will notify the public of the availability of the draft EA through publication of a public notice in a local newspaper. FEMA will conduct a 30-day public comment period commencing on the initial publication date of the public notice. Any public comments received will be addressed in the Final EA.

7.0 AGENCY COORDINATION AND PERMITS

The following agencies and organizations were contacted by letter requesting project review during the preparation of this EA. Responses received to date are included in Appendix C.

- U.S. Army Corps of Engineers, Tulsa District
- U.S. Fish and Wildlife Service, Oklahoma Ecological Services Field Office
- U.S. Department of Agriculture, Natural Resources Conservation Service, Oklahoma State Office
- U.S. Environmental Protection Agency, Region VI Office
- Oklahoma Department of Environmental Quality, Water Quality Division
- City of Edmond Engineering Department, Floodplain Manager
- Oklahoma Department of Wildlife Conservation
- Oklahoma Conservation Commission
- Oklahoma Water Resources Board, Planning and Management Division
- Oklahoma Department of Transportation, Environmental Programs Division
- Oklahoma State Historic Preservation Office, Oklahoma Historical Society
- Oklahoma Archeological Survey, The University of Oklahoma

In accordance with applicable local, state, and federal regulations, the applicant would be responsible for acquiring any necessary permits prior to commencing construction at the proposed project site.

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Appendix A
Figures

Appendix B
Design Documents for Proposed Action Alternative

Appendix C
Agency Coordination

Appendix D
8 Step Review for Executive Order 11988

Appendix E
Phase I Environmental Site Assessment

Appendix F
Archeological and Above-Ground Resource Survey

Appendix G
Public Notice of Draft EA